WHAT IS CLAIMED IS:

1. A method for forming a cylindrical bearing for use with a rolling raceway surface comprising:

carbonitriding a surface of said bearing part to form a layer containing 30 to 80% retained austenite in the vicinity of a surface carburizing layer used as a rolling raceway surface of the roller of the cylindrical bearing.

2. The method recited in claim 1, wherein:

the step of caronitriding includes forming said layer containing 30 to 80% retained austenite in the vicinity of a surface carburizing layer used as a rolling raceway surface of the roller bearing;

subjecting the surface of the layer t finishing so as to have a deviation from circular form, a cylindricity and a surface roughness effective as a rolling raceway surface of the roller of the cylindrical roller bearing or needle roller bearing.

3. A method for producing a bearing structure, comprising:

carbonitriding a surface of said bearing part to form a layer containing 30 to 80% retained austenite for contacting a surface carburizing layer used as a rolling raceway surface of the roller of the cylindrical bearing;

forming one of a cylindrical roller bearing and a needle roller bearing;

carbonitriding a surface of said bearing to produce an amount of retained austenite in a surface layer that is increased by about 30%;

subjecting a surface layer of said roller to a heat treatment effective to apply a residual compression stress; and then

subjecting said roller to a surface finishing which produces micro concavo-convex portions in a random direction.